

## Love is in the air: Arboreal copulations in the Pheasant Coucal *Centropus phasianinus*

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The mating behaviour of birds often involves loud calls for mate attraction and conspicuous courtship displays, typically by the male, which are sometimes followed by copulation (Andersson 1994). However, unlike calls and courtship displays, which are designed to draw attention to the bird, copulations are rarely observed. This scarcity of observations is not unexpected as copulations are usually short and infrequent, and often take place when or where observations are difficult, such as before sunrise or in dense vegetation (Kempnaers *et al.* 1995, Double & Cockburn 2000). Since copulations are central to the mating behaviour of birds, even a few observations can improve our understanding of mating systems and sex-roles.

A better knowledge of the copulation behaviour of Pheasant Coucals *Centropus phasianinus* is of particular interest because of their unusual sex-roles and an extreme and reversed testis asymmetry. In Pheasant Coucals, parental care is predominantly performed by the male, which weighs about 50% less than the female (Taplin & Beurteaux 1992, Higgins 1999). Based on these features, a reversal of the classic sex-roles of male mating competition and female mate choice (Darwin 1871) has been suggested for Pheasant Coucals (Higgins 1999), but a recent observational study contradicts this idea (Maurer 2006).

Coucals are exceptional amongst birds for their reduction or loss of the left testis (Bernstein 1860, Ligon 1997). Normally the left testis of birds exceeds the right testis in size (Lake 1984) and this asymmetry may have evolved as a consequence of the lack of a right ovary in most female birds (Delehanty *et al.* 2005). A bigger left than right testis, with concomitant increases in sperm production by the left testis, could promote sperm-transfer and fertilization. The mechanics of avian copulations may mean that sperm transfer is further enhanced if the male mounts the female from the left rather than the right side (Delehanty *et al.* 2005). This hypothesis is supported by the finding of a left side bias in mountings by the Chukar-partridge *Alectoris chukar* (Delehanty *et al.* 2005). The reversed testis asymmetry in coucals raises the question of whether coucals also preferentially mount from the right side.

Two copulations of Pheasant Coucals have been described in detail and these took place on or near the ground (Mackness 1979, Coates 1985). This is not surprising, since coucals are largely terrestrial and hunt and nest mainly on the ground (Higgins 1999). Both copulations were preceded by a chase, during which both birds were

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crouched and the male followed the female, sometimes carrying a food item such as a grasshopper (Orthoptera). Eventually the female stopped and straightened her body, which seemed to prompt the male to mount her and then feed her while copulating. Neither description of copulations mentions the direction of the mounting.

Ten copulations by five different pairs were observed during a larger behavioural study of coucals, conducted near Howard Springs, Northern Territory between December and March during 2003-2006. In contrast to previous observations, none of these copulations took place on the ground. Instead, the pairs copulated sitting on a horizontal branch approximately 5-20 m above the ground. The copulations took place between 07:20 and 10:30 hours. Pheasant Coucals were seen copulating at all stages of the breeding cycle, except when they had fledglings, as follows: once during the laying period, twice during the incubation period, once during the nestling period, and five times at an unknown stage. One copulation took place straight after a nest loss, but it is not clear whether it preceded a new nesting attempt. This was the only copulation for which the identity of the resident male and female could be confirmed due to individual moult-patterns. An additional four copulations involved the resident male but the female's identity was unclear, while in the remaining five copulations either or both sexes may have been strangers to the territory where the copulation took place. Most observations involved a single copulation, but two and four consecutive copulation attempts were observed once each.

Typically, the arboreal copulations of Pheasant Coucals followed the pattern described below. In the 30 minutes before the copulations, each sex gave a few territorial Scale and Monotonous calls (Higgins 1999) from trees up to 100 m apart. Sometimes, either sex also joined their partner's Scale calls to form a Duetting Scale call (Higgins 1999). Then the male approached the female, usually carrying a food item (five times) or a leaf (twice) in his beak. During this approach, the male drooped his wings and fanned his tail and sometimes bobbed his head and tail up and down. Quiet chuffing and grunting noises were given by both birds as the male drew closer. In about half the cases the male then mounted the female within 30 seconds and fed her. In the other cases the male faced the female and she assessed the nuptial gift before allowing the male to mount, or pecked his head, presumably because she was dissatisfied with the item presented. The pecking usually prompted the male to return to the ground for approximately 5 minutes to find a different food item and repeat the courting. Cloacal contact lasted for approximately 10 seconds although some copulation attempts only took 2-3 seconds and were possibly unsuccessful. The direction of mounting was noted three times and the male mounted from either the right (twice) or the left side. After copulation, the male usually left within a minute, while the female remained in the tree for several minutes.

Pheasant Coucals may perform copulations in trees, despite their otherwise largely terrestrial habits, to reduce the risk of predation. As one coucal's attention is drawn towards the other during copulation, its vigilance may be reduced, while its precopulatory calls could make it more obvious to predators. In the dense undergrowth

of the study site, this could give predators such as Dingoes *Canis lupus dingo* an opportunity to creep up on the birds unnoticed. Alternatively, arboreal copulations could function to advertise a mating and territorial ownership to neighbours, although no neighbours were seen to observe such matings.

The observed pattern of copulation indicates that female Pheasant Coucals decide whether to mate or not based on the nuptial gifts the male offers, and suggests female choice. It therefore supports classical, rather than reversed, sex roles in Pheasant Coucals. Duetting behaviour may play a role in coordinating some copulations, but is not essential. Males mount females from either side, but more observations are needed to assess whether the reversed testicular asymmetry of Pheasant Coucals also leads to a preference to mount from the right rather than the left side of the female.

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